EX PARTE OR LATE FILED

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September 19, 1994

WRITER'S DIRECT DIAL NUMBER
(202) 434-4136

DOCKET FILE COPY ORIGINAL



Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

**VIA HAND DELIVERY**

Re: FCC ET Docket No. 94-32,
Notice of Inquiry,
Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use;
In the Matter of Amendment of Part 15 of the Rules With Regard to the Operation of Spread Spectrum Antennas,
Petition for Rule Making and Request for Immediate Waiver by Western Multiplex Corporation,
RM-8435

**Ex Parte Presentation**

Dear Mr. Caton:

Pursuant to Section 1.1206(a)(2) of the Commission's rules, as adopted in the Report and Order in Gen. Docket No. 86-225, 2 FCC Rcd. 3011 (1987), enclosed are copies of the engineering material distributed by the Southern Company during ex parte meetings held on September 19, 1994 concerning the above-captioned matters. Mr. Jim Davis of the Southern Company met, along with myself and Joseph M. Sandri, Jr. of this firm, with:

1. Richard Smith, Chief of the Office of Engineering and Technology; and

2. James Coltharp, Office of Commissioner Andrew C. Barrett.

Kindly place this material in the public file. Should you have any comments or questions, please do not hesitate to contact the undersigned.

Cordially yours,

Carole C. Harris/g.n.d.

Carole C. Harris
Attorney for
Southern Company

Enclosure

JEFA INTERNATIONAL, INC.
1108 Dobie Dr.
Plano, TX 75074
(214) 424-5680

June 14, 1994

Mr. Jim Davis
Southern Communications Services
600 North 18th Street
Birmingham, AL 35291

RE: Reliability Calculations for Larus Radios

Dear Jim:

Enclosed please find reliability calculations for three hypothetical microwave paths using the Larus 4-DS1 2.4 GHz spread spectrum radio. The first path has difficult climate and terrain, the second has less difficult and the third shows good climate and terrain. The other factors were kept constant and then the path length was adjusted for each path until the outage objective of 100 seconds per year (99.99968% availability) was obtained.

The calculations show that to meet the Southern Company Services' reliability objective, path lengths must be kept under 4 to 6 miles maximum, depending on terrain and climate.

Please call me at 1869 if you have any questions or require additional information.

Sincerely,

John Post
Survey Manager

JEP/me

Enclosures

CC: Kishore Asirvadam, *JEFA* International

**********
* Microwave Path Analysis *
**********

| | | | |
|---|---|---|---|
| equency | MHz: | 2450 | 2450 |
| te | : | SITA A | SITE B |
| titude | DMS: | 33 :30:0 00 N | 33 :33:15.0 N |
| ngitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| evation - AMSL | Ft: | 0 | 0 |
| wer Height | Ft: | 0 | 0 |
| imuth | Deg: | 027.258 | 207.277 |
| th Length - Inverse Pos. | Mi/km: | 4.200 / 6.759 | |
| th Loss | dB: | 116.85 ---> | <--- 116.85 |
| ffraction Loss | dB: | 0.00 | |
| in Attenuation | dB: | 0.00 | |
| ansmission Line Type | : | | |
| ansmission Line Length | Ft: | 0.0 | 0.0 |
| ansmission Line Loss/100 Ft | dB: | 0.00 | 0.00 |
| ansmission Line Loss | dB: | 0.00 | 0.00 |
| mper Loss | dB: | 0.00 | 0.00 |
| tenna Radome Loss | dB: | 0.00 | 0.00 |
| it Stdby Switch Loss | dB: | 0.00 | 0.00 |
| ceiver Hybrid Loss | dB: | 0.00 | 0.00 |
| it Power Splitter Loss | dB: | 0.00 | 0.00 |
| Branching Loss | dB: | 0.00 | 0.00 |
| nnector & Safety Loss | dB: | 1.00 | 1.00 |
| it Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| vr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| tal System Loss | dB: | 118.85 ---> | <--- 118.85 |
| Manufacturer & Model No. | : | LARUS | LARUS |
| ansmitter Stability (+/-) | %: | 4DS1 | 16 QAM |
| tenna Polarization | : | | |
| tenna Mfr., Size & Type | : | 24" | 24" |
| tenna Height - Pri/Div - AGL | Ft: | 100.0 / 0.0 | 0.0 / 0.0 |
| tenna Gain - Pri/Div | dBi: | 24.00 / 0.00 | 24.00 / 0.00 |
| tal Primary Antenna Gain | dBi: | 48.00 | |
| ansmitter Power | dBm: | 13.00 | 13.00 |
| tal System Gain | dB: | 61.00 | 61.00 |
| ffective Radiated Power | dBm: | 36.00 | 36.00 |
| nfaded Receive Signal Level | dBm: | -57.85 ---> | <--- -57.85 |
| x Threshold | dBm: | -82.50 | -82.50 |
| mposite Fade Margin | dB: | +24.70 | +24.70 |
| ropagation Reliability | %: | 99.99968017 | 99.99968017 |
| utage | Sec/Year: | 100.85 | 100.85 |

* Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

limate & Terrain: 6.000 Terrain Rough.: 40.0 Avrg. Temp: 68

ade Margins (dB): DFM: 75 AIFM: 0 Model: Digital
TFM: 24.7 EIFM: 0

JEFA INTERNATIONAL, INC
1108 DOBIE DRIVE
PLANO, TX 75074

09:01:47
06-10-1994
SITEAB.LAR

**********
* Microwave Path Analysis *
**********

| | | | |
|---|---|---|---|
| equency | MHz: | 2450 | 2450 |
| te | : | SITA A | SITE B |
| titude | DMS: | 33 :30:0 00 N | 33 :33:35.0 N |
| ngitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| evation - AMSL | Ft: | 0 | 0 |
| wer Height | Ft: | 0 | 0 |
| imuth | Deg: | 025.045 | 205.063 |
| th Length - Inverse Pos. | Mi/km: | 4.543 / 7.312 | |
| th Loss | dB: | 117.53 ---> | <--- 117.53 |
| ffraction Loss | dB: | 0.00 | |
| in Attenuation | dB: | 0.00 | |
| ansmission Line Type | : | | |
| ansmission Line Length | Ft: | 0.0 | 0.0 |
| ansmission Line Loss/100 Ft | dB: | 0.00 | 0.00 |
| ansmission Line Loss | dB: | 0.00 | 0.00 |
| mper Loss | dB: | 0.00 | 0.00 |
| tenna Radome Loss | dB: | 0.00 | 0.00 |
| nit Stdby Switch Loss | dB: | 0.00 | 0.00 |
| ceiver Hybrid Loss | dB: | 0.00 | 0.00 |
| nit Power Splitter Loss | dB: | 0.00 | 0.00 |
| ? Branching Loss | dB: | 0.00 | 0.00 |
| nnector & Safety Loss | dB: | 1.00 | 1.00 |
| nit Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| vr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| otal System Loss | dB: | 119.53 ---> | <--- 119.53 |
| F Manufacturer & Model No. | : | LARUS | LARUS |
| ransmitter Stability (+/-) | %: | 4DS1 | 16 QAM |
| ntenna Polarization | : | | |
| ntenna Mfr., Size & Type | : | 24" | 24" |
| ntenna Height - Pri/Div - AGL | Ft: | 100.0 / 0.0 | 0.0 / 0.0 |
| ntenna Gain - Pri/Div | dBi: | 24.00 / 0.00 | 24.00 / 0.00 |
| otal Primary Antenna Gain | dBi: | 48.00 | |
| ransmitter Power | dBm: | 13.00 | 13.00 |
| otal System Gain | dB: | 61.00 | 61.00 |
| ffective Radiated Power | dBm: | 36.00 | 36.00 |
| nfaded Receive Signal Level | dBm: | -58.53 ---> | <--- -58.53 |
| x Threshold | dBm: | -82.50 | -82.50 |
| omposite Fade Margin | dB: | +24.00 | +24.00 |
| ropagation Reliability | %: | 99.99968282 | 99.99968282 |
| utage | Sec/Year: | 100.02 | 100.02 |

* Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

limate & Terrain: 4.000 Terrain Rough.: 60.0 Avrg. Temp: 68

ade Margins (dB): DFM: 75 AIFM: 0 Model: Digital
TFM: 24.0 EIFM: 0

JEFA INTERNATIONAL, INC
1108 DOBIE DRIVE
PLANO, TX 75074

09:04:15
06-10-1994
SITEAB.LAR

# Microwave Path Analysis

| | | | |
|---|---|---|---|
| Frequency | MHz: | 2450 | 2450 |
| Site | : | SITA A | SITE B |
| Latitude | DMS: | 33 :30:0 00 N | 33 :34:57.0 N |
| Longitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| Elevation - AMSL | Ft: | 0 | 0 |
| Tower Height | Ft: | 0 | 0 |
| Azimuth | Deg: | 018.684 | 198.702 |
| Path Length - Inverse Pos. | Mi/km: | 6.002 / 9.660 | |
| Path Loss | dB: | 119.95 ---> | <--- 119.95 |
| Diffraction Loss | dB: | 0.00 | |
| Main Attenuation | dB: | 0.00 | |
| Transmission Line Type | : | | |
| Transmission Line Length | Ft: | 0.0 | 0.0 |
| Transmission Line Loss/100 Ft | dB: | 0.00 | 0.00 |
| Transmission Line Loss | dB: | 0.00 | 0.00 |
| Jumper Loss | dB: | 0.00 | 0.00 |
| Antenna Radome Loss | dB: | 0.00 | 0.00 |
| Unit Stdby Switch Loss | dB: | 0.00 | 0.00 |
| Receiver Hybrid Loss | dB: | 0.00 | 0.00 |
| Unit Power Splitter Loss | dB: | 0.00 | 0.00 |
| IF Branching Loss | dB: | 0.00 | 0.00 |
| Connector & Safety Loss | dB: | 1.00 | 1.00 |
| Unit Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| Rcvr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| Total System Loss | dB: | 121.95 ---> | <--- 121.95 |
| IF Manufacturer & Model No. | : | LARUS | LARUS |
| Transmitter Stability (+/-) | %: | 4DS1 | 16 QAM |
| Antenna Polarization | : | | |
| Antenna Mfr., Size & Type | : | 24" | 24" |
| Antenna Height - Pri/Div - AGL | Ft: | 100.0 / 0.0 | 0.0 / 0.0 |
| Antenna Gain - Pri/Div | dBi: | 24.00 / 0.00 | 24.00 / 0.00 |
| Total Primary Antenna Gain | dBi: | 48.00 | |
| Transmitter Power | dBm: | 13.00 | 13.00 |
| Total System Gain | dB: | 61.00 | 61.00 |
| Effective Radiated Power | dBm: | 36.00 | 36.00 |
| Unfaded Receive Signal Level | dBm: | -60.95 ---> | <--- -60.95 |
| Rx Threshold | dBm: | -82.50 | -82.50 |
| Composite Fade Margin | dB: | +21.60 | +21.60 |
| Propagation Reliability | %: | 99.99968226 | 99.99968226 |
| Outage | Sec/Year: | 100.19 | 100.19 |

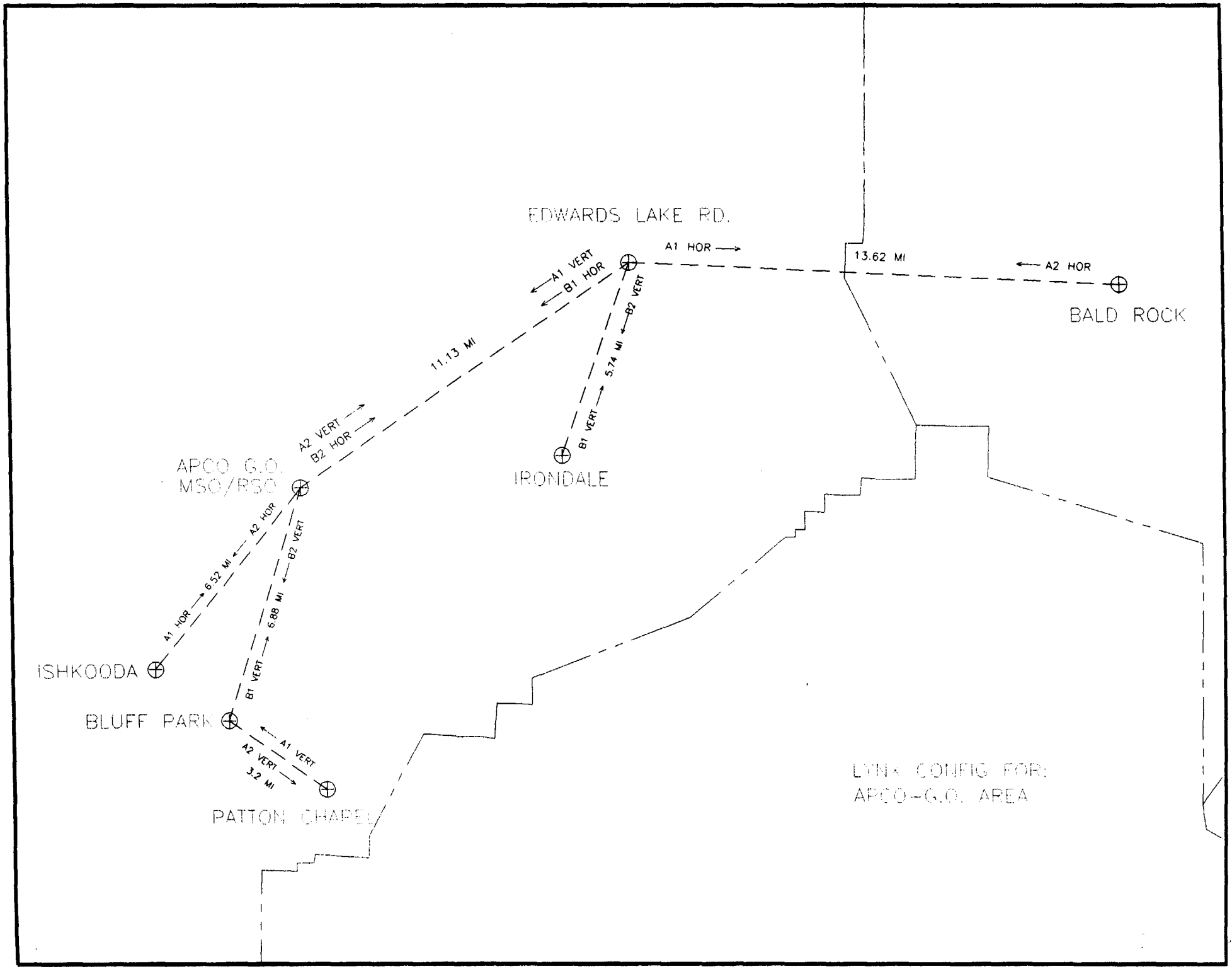
* Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

Climate & Terrain: 1.000 Terrain Rough.: 140.0 Avrg. Temp: 68

Fade Margins (dB): DFM: 75 AIFM: 0 Model: Digital
TFM: 21.6 EIFM: 0

JEFA INTERNATIONAL, INC
1108 DOBIE DRIVE
PLANO, TX 75074

09:07:03
06-10-1994
SITEAB.LAR


EDWARDS LAKE RD.
A1 HOR
13.62 MI
A2 HOR
BALD ROCK
A1 VERT
B1 HOR
B2 VERT
5.74 MI
B1 VERT
IRONDALE
11.13 MI
A2 VERT
B2 HOR
APCO G.O.
MSO/RSO
A2 HOR
6.52 MI
A1 HOR
ISHKOODA
B2 VERT
6.88 MI
B1 VERT
BLUFF PARK
A1 VERT
A2 VERT
3.2 MI
PATTON CHAPEL
LINK CONFIG FOR:
APCO-G.O. AREA

"JEFA INTERNATIONAL, INC." 4/26/94

Table showing seconds and percentage availability

| # Seconds | % Availability | Seconds | % Availability |
|---|---|---|---|
| 10 | 99.99997 | 800 | 99.99746 |
| 20 | 99.99994 | 850 | 99.99730 |
| 30 | 99.99990 | 900 | 99.99715 |
| 40 | 99.99987 | 950 | 99.99699 |
| 50 | 99.99984 | 1000 | 99.99683 |
| 60 | 99.99981 | 1050 | 99.99667 |
| 70 | 99.99978 | 1100 | 99.99651 |
| 80 | 99.99975 | 1150 | 99.99635 |
| 90 | 99.99971 | 1200 | 99.99619 |
| 15 MAX 100 | 99.99968 | 1250 | 99.99604 |
| 120 | 99.99962 | 1300 | 99.99588 |
| 140 | 99.99956 | 1350 | 99.99572 |
| 160 | 99.99949 | 1400 | 99.99556 |
| 180 | 99.99943 | 1450 | 99.99540 |
| 200 | 99.99937 | 1500 | 99.99524 |
| 220 | 99.99930 | 1550 | 99.99508 |
| 240 | 99.99924 | 1600 | 99.99493 |
| 260 | 99.99918 | 1650 | 99.99477 |
| 280 | 99.99911 | 1700 | 99.99461 |
| 15-20 300 | 99.99905 | 1750 | 99.99445 |
| 320 | 99.99899 | 1800 | 99.99429 |
| 340 | 99.99892 | 1850 | 99.99413 |
| ~20-30 360 | 99.99886 | 1900 | 99.99398 |
| 380 | 99.99880 | 1950 | 99.99382 |
| 400 | 99.99873 | 2000 | 99.99366 |
| 420 | 99.99867 | 2050 | 99.99350 |
| 440 | 99.99860 | 2100 | 99.99334 |
| 460 | 99.99854 | 2150 | 99.99318 |
| 480 | 99.99848 | 2200 | 99.99302 |
| 500 | 99.99841 | 2250 | 99.99287 |
| 520 | 99.99835 | 2300 | 99.99271 |
| 540 | 99.99829 | 2350 | 99.99255 |
| 560 | 99.99822 | 2400 | 99.99239 |
| 580 | 99.99816 | 2450 | 99.99223 |
| 600 | 99.99810 | 2500 | 99.99207 |
| 650 | 99:99794 | 2550 | 99.99191 |
| 700 | 99.99778 | 2600 | 99.99176 |
| 750 | 99.99762 | 2650 | 99.99160 |

JEFA INTERNATIONAL, INC.
1108 Dobie Dr
Plano, TX 75074
(214) 424-5680

June 14, 1994

Mr. Jim Davis
Southern Communications Services
600 North 18th Street
Birmingham, AL 35291

RE: Reliability Calculations for Western Multiplex 2.4 GHz Spread Spectrum Radios

Dear Jim:

Enclosed please find reliability calculations for nine hypothetical microwave paths using Western Multiplex 1-DS1 2.4 GHz spread spectrum radios. The Lynx12 with +28.0 dBm transmit power and no restriction on EIRP (old FCC rules) and the LynxCP2 with +13.0 dBm maximum EIRP of +36.0 dBm (new FCC rules) are shown. All the paths have 100 or 101 seconds per year predicted outage (99.99968% availability).

| Path Number | Radio Model | Transmit Power (dBm) | EIRP (dBm) | Climate/ Terrain | Coax Length (feet) | Antenna Diameter (feet) | Path Length (miles) |
|---|---|---|---|---|---|---|---|
| 1 | Lynx12 | +28.0 | +50.0 | difficult | 174 | 4 | 10.78 |
| 2 | Lynx12 | +28.0 | +50.0 | average | 174 | 4 | 11.68 |
| 3 | Lynx12 | +28.0 | +56.5 | difficult | 174 | 8 | 19.62 |
| 4 | Lynx12 | +28.0 | +56.5 | average | 174 | 8 | 21.26 |
| 5 | LynxCP2 | +13.0 | +36.0 | difficult | 87 | 4 | 5.93 |
| 6 | LynxCP2 | +13.0 | +36.0 | average | 87 | 4 | 6.42 |
| 7 | LynxCP2 | +13.0 | +36.0 | difficult | 370 | 8 | 5.93 |
| 8 | LynxCP2 | +13.0 | +36.0 | difficult | 87 | 8 | 7.99 |
| 9 | LynxCP2 | +13.0 | +36.0 | average | 87 | 8 | 8.66 |

Please call me at 1869 if you have any questions or require additional information.

Sincerely,

John Post
Survey Manager

JEP/me

Enclosures

CC: Kishore Asirvadam, *JEFA* International

# * Microwave Path Analysis *

| | | | |
|---|---|---|---|
| equency | MHz: | 2450 | 2450 |
| te | : | SITA A | SITE B |
| titude | DMS: | 33 :30:0 00 N | 33 :39:14.0 N |
| ngitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| evation - AMSL | Ft: | 0 | 0 |
| wer Height | Ft: | 0 | 0 |
| imuth | Deg: | 010.267 | 190.286 |
| th Length - Inverse Pos. | Mi/km: | 10.778 / 17.346 | |
| th Loss | dB: | 125.03 ---> | <--- 125.03 |
| ffraction Loss | dB: | 0.00 | |
| in Attenuation | dB: | 0.00 | |
| ansmission Line Type | : | LDF5-50A | LDF5-50A |
| ansmission Line Length | Ft: | 174.0 | 174.0 |
| ansmission Line Loss/100 Ft | dB: | 2.30 | 2.30 |
| ansmission Line Loss | dB: | 4.00 | 4.00 |
| mper Loss | dB: | 0.50 | 0.50 |
| tenna Radome Loss | dB: | 0.00 | 0.00 |
| it Stdby Switch Loss | dB: | 0.00 | 0.00 |
| ceiver Hybrid Loss | dB: | 0.00 | 0.00 |
| it Power Splitter Loss | dB: | 0.00 | 0.00 |
| Branching Loss | dB: | 0.00 | 0.00 |
| nnector & Safety Loss | dB: | 0.50 | 0.50 |
| it Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| vr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| tal System Loss | dB: | 135.04 ---> | <--- 135.04 |
| Manufacturer & Model No. | : | Lynx12 | Lynx12 |
| ansmitter Stability (+/-) | %: | | |
| tenna Polarization | : | | |
| tenna Mfr., Size & Type | : | 4' | 4' |
| tenna Height - Pri/Div - AGL | Ft: | 114.0 / 0.0 | 114.0 / 0.0 |
| tenna Gain - Pri/Div | dBi: | 27.00 / 0.00 | 27.00 / 0.00 |
| tal Primary Antenna Gain | dBi: | 54.00 | |
| ansmitter Power | dBm: | 28.00 | 28.00 |
| tal System Gain | dB: | 82.00 | 82.00 |
| fective Radiated Power | dBm: | 50.00 | 50.00 |
| faded Receive Signal Level | dBm: | -53.04 ---> | <--- -53.04 |
| Threshold | dBm: | -90.00 | -90.00 |
| mposite Fade Margin | dB: | +37.00 | +37.00 |
| opagation Reliability | %: | 99.99968162 | 99.99968162 |
| tage | Sec/Year: | 100.40 | 100.40 |

* Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

limate & Terrain: 6.000 Terrain Rough.: 40.0 Avrg. Temp: 68

ade Margins (dB): DFM: 81 AIFM: 0 Model: Digital
TFM: 37.0 EIFM: 0

JEFA INTERNATIONAL, INC
1108 DOBIE DRIVE
PLANO, TX 75074

09:51:48
06-10-1994
SITEAB.L12

# * Microwave Path Analysis *

| | | | |
|---|---|---|---|
| equency | MHz: | 2450 | 2450 |
| te | : | SITA A | SITE B |
| titude | DMS: | 33 :30:0 00 N | 33 :40:02.0 N |
| ngitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| evation - AMSL | Ft: | 0 | 0 |
| wer Height | Ft: | 0 | 0 |
| imuth | Deg: | 009.463 | 189.481 |
| th Length - Inverse Pos. | Mi/km: | 11.684 / 18.803 | |
| th Loss | dB: | 125.74 ---> | <--- 125.74 |
| ffraction Loss | dB: | 0.00 | |
| in Attenuation | dB: | 0.00 | |
| ansmission Line Type | : | LDF5-50A | LDF5-50A |
| ansmission Line Length | Ft: | 174.0 | 174.0 |
| ansmission Line Loss/100 Ft | dB: | 2.30 | 2.30 |
| ansmission Line Loss | dB: | 4.00 | 4.00 |
| mper Loss | dB: | 0.50 | 0.50 |
| tenna Radome Loss | dB: | 0.00 | 0.00 |
| it Stdby Switch Loss | dB: | 0.00 | 0.00 |
| ceiver Hybrid Loss | dB: | 0.00 | 0.00 |
| it Power Splitter Loss | dB: | 0.00 | 0.00 |
| Branching Loss | dB: | 0.00 | 0.00 |
| nnector & Safety Loss | dB: | 0.50 | 0.50 |
| it Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| vr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| tal System Loss | dB: | 135.74 ---> | <--- 135.74 |
| Manufacturer & Model No. | : | Lynx12 | Lynx12 |
| ansmitter Stability (+/-) | %: | | |
| tenna Polarization | : | | |
| tenna Mfr., Size & Type | : | 4' | 4' |
| tenna Height - Pri/Div - AGL | Ft: | 114.0 / 0.0 | 114.0 / 0.0 |
| tenna Gain - Pri/Div | dBi: | 27.00 / 0.00 | 27.00 / 0.00 |
| tal Primary Antenna Gain | dBi: | 54.00 | |
| ansmitter Power | dBm: | 28.00 | 28.00 |
| tal System Gain | dB: | 82.00 | 82.00 |
| fective Radiated Power | dBm: | 50.00 | 50.00 |
| faded Receive Signal Level | dBm: | -53.74 ---> | <--- -53.74 |
| Threshold | dBm: | -90.00 | -90.00 |
| mposite Fade Margin | dB: | +36.30 | +36.30 |
| opagation Reliability | %: | 99.99968235 | 99.99968235 |
| tage | Sec/Year: | 100.16 | 100.16 |

* Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

imate & Terrain: 4.000 Terrain Rough.: 100.0 Avrg. Temp: 68

ade Margins (dB): DFM: 81 AIFM: 0 Model: Digital
TFM: 36.3 EIFM: 0

JEFA INTERNATIONAL, INC
1108 DOBIE DRIVE
PLANO, TX 75074

09:53:23
06-10-1994
SITEAB.L12

**********
* Microwave Path Analysis *
**********

| | | | |
|---|---|---|---|
| equency | MHz: | 2450 | 2450 |
| te | : | SITA A | SITE B |
| titude | DMS: | 33 :30:0 00 N | 33 :47:00.0 N |
| ngitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| evation - AMSL | Ft: | 0 | 0 |
| wer Height | Ft: | 0 | 0 |
| imuth | Deg: | 005.610 | 185.629 |
| th Length - Inverse Pos. | Mi/km: | 19.621 / 31.577 | |
| th Loss | dB: | 130.24 ---> | <--- 130.24 |
| ffraction Loss | dB: | 0.00 | |
| in Attenuation | dB: | 0.00 | |
| ansmission Line Type | : | LDF5-50A | LDF5-50A |
| ansmission Line Length | Ft: | 174.0 | 174.0 |
| ansmission Line Loss/100 Ft | dB: | 2.30 | 2.30 |
| ansmission Line Loss | dB: | 4.00 | 4.00 |
| mper Loss | dB: | 0.50 | 0.50 |
| tenna Radome Loss | dB: | 0.00 | 0.00 |
| it Stdby Switch Loss | dB: | 0.00 | 0.00 |
| ceiver Hybrid Loss | dB: | 0.00 | 0.00 |
| it Power Splitter Loss | dB: | 0.00 | 0.00 |
| Branching Loss | dB: | 0.00 | 0.00 |
| nnector & Safety Loss | dB: | 0.50 | 0.50 |
| it Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| vr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| tal System Loss | dB: | 140.24 ---> | <--- 140.24 |
| Manufacturer & Model No. | : | Lynx12 | Lynx12 |
| ansmitter Stability (+/-) | %: | | |
| tenna Polarization | : | | |
| tenna Mfr., Size & Type | : | 8' | 8' |
| tenna Height - Pri/Div - AGL | Ft: | 114.0 / 0.0 | 114.0 / 0.0 |
| tenna Gain - Pri/Div | dBi: | 33.50 / 0.00 | 33.50 / 0.00 |
| tal Primary Antenna Gain | dBi: | 67.00 | |
| ansmitter Power | dBm: | 28.00 | 28.00 |
| tal System Gain | dB: | 95.00 | 95.00 |
| fective Radiated Power | dBm: | 56.50 | 56.50 |
| faded Receive Signal Level | dBm: | -45.24 ---> | <--- -45.24 |
| Threshold | dBm: | -90.00 | -90.00 |
| mposite Fade Margin | dB: | +44.79 | +44.79 |
| opagation Reliability | %: | 99.99968119 | 99.99968119 |
| tage | Sec/Year: | 100.53 | 100.53 |

* Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

imate & Terrain: 6.000 Terrain Rough.: 40.0 Avrg. Temp: 68

ide Margins (dB): DFM: 81 AIFM: 0 Model: Digital
TFM: 44.8 EIFM: 0

JEFA INTERNATIONAL, INC
1108 DOBIE DRIVE
PLANO, TX 75074

09:49:09
06-10-1994
SITEAB.L12

**********
* Microwave Path Analysis *
**********

| | | | |
|---|---|---|---|
| equency | MHz: | 2450 | 2450 |
| te | : | SITA A | SITE B |
| titude | DMS: | 33 :30:0 00 N | 33 :48:26.0 N |
| ngitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| evation - AMSL | Ft: | 0 | 0 |
| wer Height | Ft: | 0 | 0 |
| imuth | Deg: | 005.175 | 185.194 |
| th Length - Inverse Pos. | Mi/km: | 21.260 / 34.215 | |
| th Loss | dB: | 130.93 ---> | <--- 130.93 |
| ffraction Loss | dB: | 0.00 | |
| in Attenuation | dB: | 0.00 | |
| ansmission Line Type | : | LDF5-50A | LDF5-50A |
| ansmission Line Length | Ft: | 174.0 | 174.0 |
| ansmission Line Loss/100 Ft | dB: | 2.30 | 2.30 |
| ansmission Line Loss | dB: | 4.00 | 4.00 |
| mper Loss | dB: | 0.50 | 0.50 |
| tenna Radome Loss | dB: | 0.00 | 0.00 |
| it Stdby Switch Loss | dB: | 0.00 | 0.00 |
| ceiver Hybrid Loss | dB: | 0.00 | 0.00 |
| it Power Splitter Loss | dB: | 0.00 | 0.00 |
| Branching Loss | dB: | 0.00 | 0.00 |
| nnector & Safety Loss | dB: | 0.50 | 0.50 |
| it Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| vr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| tal System Loss | dB: | 140.94 ---> | <--- 140.94 |
| Manufacturer & Model No. | : | Lynx12 | Lynx12 |
| ansmitter Stability (+/-) | %: | | |
| tenna Polarization | : | | |
| tenna Mfr., Size & Type | : | 8' | 8' |
| tenna Height - Pri/Div - AGL | Ft: | 114.0 / 0.0 | 114.0 / 0.0 |
| tenna Gain - Pri/Div | dBi: | 33.50 / 0.00 | 33.50 / 0.00 |
| tal Primary Antenna Gain | dBi: | 67.00 | |
| ansmitter Power | dBm: | 28.00 | 28.00 |
| tal System Gain | dB: | 95.00 | 95.00 |
| fective Radiated Power | dBm: | 56.50 | 56.50 |
| faded Receive Signal Level | dBm: | -45.94 ---> | <--- -45.94 |
| Threshold | dBm: | -90.00 | -90.00 |
| mposite Fade Margin | dB: | +44.09 | +44.09 |
| opagation Reliability | %: | 99.99968235 | 99.99968235 |
| tage | Sec/Year: | 100.17 | 100.17 |

* Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

imate & Terrain: 4.000 Terrain Rough.: 100.0 Avrg. Temp: 68

ide Margins (dB): DFM: 81 AIFM: 0 Model: Digital
TFM: 44.1 EIFM: 0

JEFA INTERNATIONAL, INC
1108 DOBIE DRIVE
PLANO, TX 75074

09:47:56
06-10-1994
SITEAB.L12

# * Microwave Path Analysis *

| | | | |
|---|---|---|---|
| requency | MHz: | 2450 | 2450 |
| ite | : | SITA A | SITE B |
| atitude | DMS: | 33 :30:0 00 N | 33 :34:53.0 N |
| ongitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| levation - AMSL | Ft: | 0 | 0 |
| ower Height | Ft: | 0 | 0 |
| zimuth | Deg: | 018.921 | 198.940 |
| ath Length - Inverse Pos. | Mi/km: | 5.930 / 9.543 | |
| ath Loss | dB: | 119.84 ---> | <--- 119.84 |
| iffraction Loss | dB: | 0.00 | |
| ain Attenuation | dB: | 0.00 | |
| ransmission Line Type | : | LDF5-50A | LDF5-50A |
| ransmission Line Length | Ft: | 87.0 | 87.0 |
| ransmission Line Loss/100 Ft | dB: | 2.30 | 2.30 |
| ransmission Line Loss | dB: | 2.00 | 2.00 |
| umper Loss | dB: | 0.50 | 0.50 |
| ntenna Radome Loss | dB: | 0.00 | 0.00 |
| mit Stdby Switch Loss | dB: | 0.00 | 0.00 |
| eceiver Hybrid Loss | dB: | 0.00 | 0.00 |
| mit Power Splitter Loss | dB: | 0.00 | 0.00 |
| F Branching Loss | dB: | 0.00 | 0.00 |
| onnector & Safety Loss | dB: | 1.50 | 1.50 |
| mit Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| cvr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| otal System Loss | dB: | 127.85 ---> | <--- 127.85 |
| F Manufacturer & Model No. | : | LynxCP2 | LynxCP2 |
| ransmitter Stability (+/-) | %: | | |
| ntenna Polarization | : | | |
| ntenna Mfr., Size & Type | : | 4' | 4' |
| ntenna Height - Pri/Div - AGL | Ft: | 57.0 / 0.0 | 57.0 / 0.0 |
| ntenna Gain - Pri/Div | dBi: | 27.00 / 0.00 | 27.00 / 0.00 |
| otal Primary Antenna Gain | dBi: | 54.00 | |
| ransmitter Power | dBm: | 13.00 | 13.00 |
| otal System Gain | dB: | 67.00 | 67.00 |
| ffective Radiated Power | dBm: | 36.00 | 36.00 |
| nfaded Receive Signal Level | dBm: | -60.85 ---> | <--- -60.85 |
| x Threshold | dBm: | -90.00 | -90.00 |
| omposite Fade Margin | dB: | +29.20 | +29.20 |
| ropagation Reliability | %: | 99.99968056 | 99.99968056 |
| utage | Sec/Year: | 100.73 | 100.73 |

* * Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

limate & Terrain: 6.000 Terrain Rough.: 40.0 Avrg. Temp: 68

ade Margins (dB): DFM: 81 AIFM: 0 Model: Digital
TFM: 29.2 EIFM: 0

**********
* Microwave Path Analysis *
**********

| | | | |
|---|---|---|---|
| equency | MHz: | 2450 | 2450 |
| te | : | SITA A | SITE B |
| titude | DMS: | 33 :30:0 00 N | 33 :35:20.0 N |
| ngitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| evation - AMSL | Ft: | 0 | 0 |
| wer Height | Ft: | 0 | 0 |
| imuth | Deg: | 017.424 | 197.442 |
| th Length - Inverse Pos. | Mi/km: | 6.421 / 10.333 | |
| th Loss | dB: | 120.54 ---> | <--- 120.54 |
| ffraction Loss | dB: | 0.00 | |
| in Attenuation | dB: | 0.00 | |
| ansmission Line Type | : | LDF5-50A | LDF5-50A |
| ansmission Line Length | Ft: | 87.0 | 87.0 |
| ansmission Line Loss/100 Ft | dB: | 2.30 | 2.30 |
| ansmission Line Loss | dB: | 2.00 | 2.00 |
| mper Loss | dB: | 0.50 | 0.50 |
| tenna Radome Loss | dB: | 0.00 | 0.00 |
| it Stdby Switch Loss | dB: | 0.00 | 0.00 |
| ceiver Hybrid Loss | dB: | 0.00 | 0.00 |
| it Power Splitter Loss | dB: | 0.00 | 0.00 |
| Branching Loss | dB: | 0.00 | 0.00 |
| nnector & Safety Loss | dB: | 1.50 | 1.50 |
| it Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| vr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| tal System Loss | dB: | 128.54 ---> | <--- 128.54 |
| Manufacturer & Model No. | : | LynxCP2 | LynxCP2 |
| ansmitter Stability (+/-) | %: | | |
| tenna Polarization | : | | |
| tenna Mfr., Size & Type | : | 4' | 4' |
| tenna Height - Pri/Div - AGL | Ft: | 57.0 / 0.0 | 57.0 / 0.0 |
| tenna Gain - Pri/Div | dBi: | 27.00 / 0.00 | 27.00 / 0.00 |
| tal Primary Antenna Gain | dBi: | 54.00 | |
| ansmitter Power | dBm: | 13.00 | 13.00 |
| tal System Gain | dB: | 67.00 | 67.00 |
| ffective Radiated Power | dBm: | 36.00 | 36.00 |
| faded Receive Signal Level | dBm: | -61.54 ---> | <--- -61.54 |
| Threshold | dBm: | -90.00 | -90.00 |
| mposite Fade Margin | dB: | +28.50 | +28.50 |
| opagation Reliability | %: | 99.99968235 | 99.99968235 |
| tage | Sec/Year: | 100.17 | 100.17 |

* Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

limate & Terrain: 4.000 Terrain Rough.: 100.0 Avrg. Temp: 68

ade Margins (dB): DFM: 81 AIFM: 0 Model: Digital
TFM: 28.5 EIFM: 0

## * Microwave Path Analysis *

| | | | |
|---|---|---|---|
| equency | MHz: | 2450 | 2450 |
| te | : | SITA A | SITE B |
| titude | DMS: | 33 :30:0 00 N | 33 :34:53.0 N |
| ngitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| evation - AMSL | Ft: | 0 | 0 |
| wer Height | Ft: | 0 | 0 |
| imuth | Deg: | 018.921 | 198.940 |
| th Length - Inverse Pos. | Mi/km: | 5.930 / 9.543 | |
| th Loss | dB: | 119.84 ---> | <--- 119.84 |
| ffraction Loss | dB: | 0.00 | |
| in Attenuation | dB: | 0.00 | |
| ansmission Line Type | : | LDF5-50A | LDF5-50A |
| ansmission Line Length | Ft: | 369.5 | 369.5 |
| ansmission Line Loss/100 Ft | dB: | 2.30 | 2.30 |
| ansmission Line Loss | dB: | 8.50 | 8.50 |
| mper Loss | dB: | 0.50 | 0.50 |
| tenna Radome Loss | dB: | 0.00 | 0.00 |
| nit Stdby Switch Loss | dB: | 0.00 | 0.00 |
| ceiver Hybrid Loss | dB: | 0.00 | 0.00 |
| nit Power Splitter Loss | dB: | 0.00 | 0.00 |
| F Branching Loss | dB: | 0.00 | 0.00 |
| nnector & Safety Loss | dB: | 1.50 | 1.50 |
| nit Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| vr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| tal System Loss | dB: | 140.84 ---> | <--- 140.84 |
| F Manufacturer & Model No. | : | LynxCP2 | LynxCP2 |
| ransmitter Stability (+/-) | %: | | |
| ntenna Polarization | : | | |
| ntenna Mfr., Size & Type | : | 8' | 8' |
| ntenna Height - Pri/Div - AGL | Ft: | 340.0 / 0.0 | 340.0 / 0.0 |
| ntenna Gain - Pri/Div | dBi: | 33.50 / 0.00 | 33.50 / 0.00 |
| tal Primary Antenna Gain | dBi: | 67.00 | |
| ransmitter Power | dBm: | 13.00 | 13.00 |
| tal System Gain | dB: | 80.00 | 80.00 |
| ffective Radiated Power | dBm: | 36.00 | 36.00 |
| nfaded Receive Signal Level | dBm: | -60.84 ---> | <--- -60.84 |
| x Threshold | dBm: | -90.00 | -90.00 |
| mposite Fade Margin | dB: | +29.20 | +29.20 |
| ropagation Reliability | %: | 99.99968056 | 99.99968056 |
| utage | Sec/Year: | 100.73 | 100.73 |

* Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

limate & Terrain: 6.000 Terrain Rough.: 40.0 Avrg. Temp: 68

ade Margins (dB): DFM: 81 AIFM: 0 Model: Digital
TFM: 29.2 EIFM: 0

**********
* Microwave Path Analysis *
**********

| | | | |
|---|---|---|---|
| equency | MHz: | 2450 | 2450 |
| te | : | SITA A | SITE B |
| titude | DMS: | 33 :30:0 00 N | 33 :36:45.0 N |
| ngitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| evation - AMSL | Ft: | 0 | 0 |
| wer Height | Ft: | 0 | 0 |
| imuth | Deg: | 013.923 | 193.942 |
| th Length - Inverse Pos. | Mi/km: | 7.988 / 12.856 | |
| th Loss | dB: | 122.43 ---> | <--- 122.43 |
| ffraction Loss | dB: | 0.00 | |
| in Attenuation | dB: | 0.00 | |
| ansmission Line Type | : | LDF5-50A | LDF5-50A |
| ansmission Line Length | Ft: | 87.0 | 87.0 |
| ansmission Line Loss/100 Ft | dB: | 2.30 | 2.30 |
| ansmission Line Loss | dB: | 2.00 | 2.00 |
| mper Loss | dB: | 0.50 | 0.50 |
| tenna Radome Loss | dB: | 0.00 | 0.00 |
| it Stdby Switch Loss | dB: | 0.00 | 0.00 |
| ceiver Hybrid Loss | dB: | 0.00 | 0.00 |
| it Power Splitter Loss | dB: | 0.00 | 0.00 |
| Branching Loss | dB: | 0.00 | 0.00 |
| nnector & Safety Loss | dB: | 1.50 | 1.50 |
| it Attenuator Pad Loss | dB: | 6.50 | 6.50 |
| vr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| tal System Loss | dB: | 136.93 ---> | <--- 136.93 |
| Manufacturer & Model No. | : | LynxCP2 | LynxCP2 |
| ansmitter Stability (+/-) | %: | | |
| tenna Polarization | : | | |
| tenna Mfr., Size & Type | : | 8' | 8' |
| tenna Height - Pri/Div - AGL | Ft: | 57.0 / 0.0 | 57.0 / 0.0 |
| tenna Gain - Pri/Div | dBi: | 33.50 / 0.00 | 33.50 / 0.00 |
| tal Primary Antenna Gain | dBi: | 67.00 | |
| ansmitter Power | dBm: | 13.00 | 13.00 |
| tal System Gain | dB: | 80.00 | 80.00 |
| fective Radiated Power | dBm: | 36.00 | 36.00 |
| faded Receive Signal Level | dBm: | -56.93 ---> | <--- -56.93 |
| Threshold | dBm: | -90.00 | -90.00 |
| mposite Fade Margin | dB: | +33.10 | +33.10 |
| opagation Reliability | %: | 99.99968187 | 99.99968187 |
| tage | Sec/Year: | 100.32 | 100.32 |

* Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

imate & Terrain: 6.000 Terrain Rough.: 40.0 Avrg. Temp: 68

de Margins (dB): DFM: 81 AIFM: 0 Model: Digital
TFM: 33.1 EIFM: 0

JEFA INTERNATIONAL, INC
1108 DOBIE DRIVE
PLANO, TX 75074

09:27:14
06-10-1994
SITEAB.CP2

# * Microwave Path Analysis *

| | | | |
|---|---|---|---|
| :equency | MHz: | 2450 | 2450 |
| .te | : | SITA A | SITE B |
| ıtitude | DMS: | 33 :30:0 00 N | 33 :37:21.0 N |
| ɔngitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| .evation - AMSL | Ft: | 0 | 0 |
| ɔwer Height | Ft: | 0 | 0 |
| :imuth | Deg: | 012.824 | 192.843 |
| ıth Length - Inverse Pos. | Mi/km: | 8.659 / 13.935 | |
| ıth Loss | dB: | 123.13 ---> | <--- 123.13 |
| .ffraction Loss | dB: | 0.00 | |
| ıin Attenuation | dB: | 0.00 | |
| :ansmission Line Type | : | LDF5-50A | LDF5-50A |
| :ansmission Line Length | Ft: | 87.0 | 87.0 |
| :ansmission Line Loss/100 Ft | dB: | 2.30 | 2.30 |
| :ansmission Line Loss | dB: | 2.00 | 2.00 |
| ımper Loss | dB: | 0.50 | 0.50 |
| ıtenna Radome Loss | dB: | 0.00 | 0.00 |
| nit Stdby Switch Loss | dB: | 0.00 | 0.00 |
| ɛceiver Hybrid Loss | dB: | 0.00 | 0.00 |
| nit Power Splitter Loss | dB: | 0.00 | 0.00 |
| F Branching Loss | dB: | 0.00 | 0.00 |
| ɔnnector & Safety Loss | dB: | 1.50 | 1.50 |
| nit Attenuator Pad Loss | dB: | 6.50 | 6.50 |
| :vr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| ɔtal System Loss | dB: | 137.63 ---> | <--- 137.63 |
| F Manufacturer & Model No. | : | LynxCP2 | LynxCP2 |
| :ansmitter Stability (+/-) | %: | | |
| ıtenna Polarization | : | | |
| ıtenna Mfr., Size & Type | : | 8' | 8' |
| ıtenna Height - Pri/Div - AGL | Ft: | 57.0 / 0.0 | 57.0 / 0.0 |
| ıtenna Gain - Pri/Div | dBi: | 33.50 / 0.00 | 33.50 / 0.00 |
| ɔtal Primary Antenna Gain | dBi: | 67.00 | |
| :ansmitter Power | dBm: | 13.00 | 13.00 |
| ɔtal System Gain | dB: | 80.00 | 80.00 |
| ffective Radiated Power | dBm: | 36.00 | 36.00 |
| ıfaded Receive Signal Level | dBm: | -57.63 ---> | <--- -57.63 |
| x Threshold | dBm: | -90.00 | -90.00 |
| ɔmposite Fade Margin | dB: | +32.40 | +32.40 |
| ropagation Reliability | %: | 99.99968266 | 99.99968266 |
| ıtage | Sec/Year: | 100.07 | 100.07 |

* Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

limate & Terrain: 4.000 Terrain Rough.: 100.0 Avrg. Temp: 68

ade Margins (dB): DFM: 81 AIFM: 0 Model: Digital
TFM: 32.4 EIFM: 0

JEFA INTERNATIONAL, INC.
1108 Dobie Dr.
Plano, TX 75074
(214) 424-5680

June 22, 1994

Mr. Jim Davis
Southern Communications Services
600 North 18th Street
Birmingham, AL 35291

RE: Reliability Calculations for Western Multiplex 6 GHz Spread Spectrum Radio

Dear Jim:

Enclosed please find reliability calculations for four hypothetical microwave paths using Western Multiplex 1-DS1 6 GHz spread spectrum radios. The Lynx CP6 with maximum EIRP of +36.0 dBm (new FCC rules) are shown. All the paths have 100 or 101 seconds per year predicted outage (99.99968% availability).

| Path Num- | Radio Model | Transmit Power (dBm) | EIRP (dBm) | Climate/ Terrain | Coax Length (feet) | Antenna Diameter (feet) | Path Length (miles) |
|---|---|---|---|---|---|---|---|
| 1 | LynxCP6 | variable | +36.0 | difficult | 87 | 4 | 4.29 |
| 2 | LynxCP6 | variable | +36.0 | average | 87 | 4 | 4.67 |
| 3 | LynxCP6 | variable | +36.0 | difficult | 87 | 8 | 5.66 |
| 4 | LynxCP6 | variable | +36.0 | average | 87 | 8 | 6.14 |

Note that the coax lengths are relatively short and higher antenna heights will decrease the effective range of the systems. These calculations were done using 4' and 8' diameter dishes. Other dish sizes are available and would give slightly different results. Please call me at 1869 if you have any questions or require additional information.

Sincerely,

John Post
Survey Manager

JEP/me

Enclosures

CC: Kishore Asirvadam, *JEFA* International

```
                    ****************************
                    * Microwave Path Analysis *
                    ****************************

requency                          MHz: 6145                    6145
ite                                  : SITE A                  SITE B
atitude                           DMS: 33 :30:00.0 N           33 :33:20.5 N
ongitude                          DMS: 087:45:00.0 W           087:43:00.0 W
levation - AMSL                    Ft: 0                       0
ower Height                        Ft: 0                       0
zimuth                            Deg: 026.614                 206.633
ath Length - Inverse Pos.      Mi/km:       4.293 / 6.910
ath Loss                           dB: 125.03 --->    <--- 125.03
iffraction Loss                    dB:            0.00
ain Attenuation                    dB:            0.00
ransmission Line Type                : WE65                    WE65
ransmission Line Length            Ft: 87.0                    87.0
ransmission Line Loss/100 Ft       dB: 1.35                    1.35
ransmission Line Loss              dB: 1.17                    1.17
umper Loss                         dB: 0.50                    0.50
ntenna Radome Loss                 dB: 1.00                    1.00
mit Stdby Switch Loss              dB: 0.00                    0.00
eceiver Hybrid Loss                dB: 0.00                    0.00
mit Power Splitter Loss            dB: 0.00                    0.00
F Branching Loss                   dB: 0.00                    0.00
onnector & Safety Loss             dB: 0.50                    0.50
mit Attenuator Pad Loss            dB: 24.00                   24.00
cvr Attenuator Pad Loss            dB: 0.00                    0.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
otal System Loss                   dB: 155.38 --->    <--- 155.38
= = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
F Manufacturer & Model No.           : LYNX CP6                LYNX CP6
ransmitter Stability (+/-)           %:
ntenna Polarization                  :
ntenna Mfr., Size & Type             : 4'                      4'
ntenna Height - Pri/Div - AGL      Ft: 57.0 / 0.0              57.0 / 0.0
ntenna Gain   - Pri/Div           dBi: 35.20 / 0.00            35.20 / 0.00
otal Primary Antenna Gain         dBi:            70.40
ransmitter Power                  dBm: 28.00                   28.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
otal System Gain                   dB: 98.40                   98.40
= = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
ffective Radiated Power           dBm: 36.03                   36.03
nfaded Receive Signal Level       dBm:-56.98 --->    <--- -56.98
= = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
x Threshold                       dBm:-86.00                  -86.00
omposite Fade Margin               dB:+29.00                  +29.00
= = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
ropagation Reliability              %: 99.99968153              99.99968153
utage                      Sec/Year: 100.42                    100.42
* * Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *
limate & Terrain: 6.000        Terrain Rough.: 40.0    Avrg. Temp: 68
ade Margins (dB):      DFM: 81          AIFM: 0       Model: Digital
                       TFM: 29.0        EIFM: 0

                    JEFA INTERNATIONAL, INC                    14:28:36
                        1108 DOBIE DRIVE                       06-22-1994
                        PLANO, TX  75074                       SITEAB.CP6
```

**********
* Microwave Path Analysis *
**********

| | | | |
|---|---|---|---|
| Frequency | MHz: | 6145 | 6145 |
| Site | : | SITE A | SITE B |
| Latitude | DMS: | 33 :30:00.0 N | 33 :33:42.0 N |
| Longitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| Elevation - AMSL | Ft: | 0 | 0 |
| Tower Height | Ft: | 0 | 0 |
| Azimuth | Deg: | 024.348 | 204.366 |
| Path Length - Inverse Pos. | Mi/km: | 4.665 / 7.508 | |
| Path Loss | dB: | 125.75 ---> | <--- 125.75 |
| Diffraction Loss | dB: | 0.00 | |
| Gain Attenuation | dB: | 0.00 | |
| Transmission Line Type | : | WE65 | WE65 |
| Transmission Line Length | Ft: | 87.0 | 87.0 |
| Transmission Line Loss/100 Ft | dB: | 1.35 | 1.35 |
| Transmission Line Loss | dB: | 1.17 | 1.17 |
| Jumper Loss | dB: | 0.50 | 0.50 |
| Antenna Radome Loss | dB: | 1.00 | 1.00 |
| Xmit Stdby Switch Loss | dB: | 0.00 | 0.00 |
| Receiver Hybrid Loss | dB: | 0.00 | 0.00 |
| Xmit Power Splitter Loss | dB: | 0.00 | 0.00 |
| IF Branching Loss | dB: | 0.00 | 0.00 |
| Connector & Safety Loss | dB: | 0.50 | 0.50 |
| Xmit Attenuator Pad Loss | dB: | 24.00 | 24.00 |
| Rcvr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| Total System Loss | dB: | 156.10 ---> | <--- 156.10 |
| IF Manufacturer & Model No. | : | LYNX CP6 | LYNX CP6 |
| Transmitter Stability (+/-) | %: | | |
| Antenna Polarization | : | | |
| Antenna Mfr., Size & Type | : | 4' | 4' |
| Antenna Height - Pri/Div - AGL | Ft: | 57.0 / 0.0 | 57.0 / 0.0 |
| Antenna Gain - Pri/Div | dBi: | 35.20 / 0.00 | 35.20 / 0.00 |
| Total Primary Antenna Gain | dBi: | 70.40 | |
| Transmitter Power | dBm: | 28.00 | 28.00 |
| Total System Gain | dB: | 98.40 | 98.40 |
| Effective Radiated Power | dBm: | 36.03 | 36.03 |
| Unfaded Receive Signal Level | dBm: | -57.70 ---> | <--- -57.70 |
| Rx Threshold | dBm: | -86.00 | -86.00 |
| Composite Fade Margin | dB: | +28.30 | +28.30 |
| Propagation Reliability | %: | 99.99968004 | 99.99968004 |
| Outage | Sec/Year: | 100.90 | 100.90 |

* * Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

Climate & Terrain: 4.000 Terrain Rough.: 100.0 Avrg. Temp: 68

Fade Margins (dB): DFM: 81 AIFM: 0 Model: Digital
TFM: 28.3 EIFM: 0

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# Microwave Path Analysis

| | | | |
|---|---|---|---|
| Frequency | MHz: | 6145 | 6145 |
| Site | : | SITE A | SITE B |
| Latitude | DMS: | 33 :30:00.0 N | 33 :34:38.0 N |
| Longitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| Elevation - AMSL | Ft: | 0 | 0 |
| Tower Height | Ft: | 0 | 0 |
| Azimuth | Deg: | 019.865 | 199.883 |
| Path Length - Inverse Pos. | Mi/km: | 5.659 / 9.107 | |
| Path Loss | dB: | 127.43 ---> | <--- 127.43 |
| Diffraction Loss | dB: | 0.00 | |
| Rain Attenuation | dB: | 0.00 | |
| Transmission Line Type | : | WE65 | WE65 |
| Transmission Line Length | Ft: | 87.0 | 87.0 |
| Transmission Line Loss/100 Ft | dB: | 1.35 | 1.35 |
| Transmission Line Loss | dB: | 1.17 | 1.17 |
| Jumper Loss | dB: | 0.50 | 0.50 |
| Antenna Radome Loss | dB: | 1.00 | 1.00 |
| Xmit Stdby Switch Loss | dB: | 0.00 | 0.00 |
| Receiver Hybrid Loss | dB: | 0.00 | 0.00 |
| Xmit Power Splitter Loss | dB: | 0.00 | 0.00 |
| RF Branching Loss | dB: | 0.00 | 0.00 |
| Connector & Safety Loss | dB: | 0.83 | 0.83 |
| Xmit Attenuator Pad Loss | dB: | 30.00 | 30.00 |
| Rcvr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| Total System Loss | dB: | 164.43 ---> | <--- 164.43 |
| RF Manufacturer & Model No. | : | LYNX CP6 | LYNX CP6 |
| Transmitter Stability (+/-) | %: | | |
| Antenna Polarization | : | | |
| Antenna Mfr., Size & Type | : | 8' | 8' |
| Antenna Height - Pri/Div - AGL | Ft: | 57.0 / 0.0 | 57.0 / 0.0 |
| Antenna Gain - Pri/Div | dBi: | 41.50 / 0.00 | 41.50 / 0.00 |
| Total Primary Antenna Gain | dBi: | 83.00 | |
| Transmitter Power | dBm: | 28.00 | 28.00 |
| Total System Gain | dB: | 111.00 | 111.00 |
| Effective Radiated Power | dBm: | 36.00 | 36.00 |
| Unfaded Receive Signal Level | dBm: | -53.43 ---> | <--- -53.43 |
| Rx Threshold | dBm: | -86.00 | -86.00 |
| Composite Fade Margin | dB: | +32.60 | +32.60 |
| Propagation Reliability | %: | 99.99968171 | 99.99968171 |
| Outage | Sec/Year: | 100.37 | 100.37 |

* * Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

Climate & Terrain: 6.000 Terrain Rough.: 40.0 Avrg. Temp: 68

Fade Margins (dB): DFM: 81 AIFM: 0 Model: Digital
TFM: 32.6 EIFM: 0

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# Microwave Path Analysis

| | | | |
|---|---|---|---|
| Frequency | MHz: | 6145 | 6145 |
| Site | : | SITE A | SITE B |
| Latitude | DMS: | 33 :30:00.0 N | 33 :35:04.5 N |
| Longitude | DMS: | 087:45:00.0 W | 087:43:00.0 W |
| Elevation - AMSL | Ft: | 0 | 0 |
| Tower Height | Ft: | 0 | 0 |
| Azimuth | Deg: | 018.254 | 198.273 |
| Path Length - Inverse Pos. | Mi/km: | 6.138 / 9.879 | |
| Path Loss | dB: | 128.13 ---> | <--- 128.13 |
| Diffraction Loss | dB: | 0.00 | |
| Rain Attenuation | dB: | 0.00 | |
| Transmission Line Type | : | WE65 | WE65 |
| Transmission Line Length | Ft: | 87.0 | 87.0 |
| Transmission Line Loss/100 Ft | dB: | 1.35 | 1.35 |
| Transmission Line Loss | dB: | 1.17 | 1.17 |
| Jumper Loss | dB: | 0.50 | 0.50 |
| Antenna Radome Loss | dB: | 1.00 | 1.00 |
| Xmit Stdby Switch Loss | dB: | 0.00 | 0.00 |
| Receiver Hybrid Loss | dB: | 0.00 | 0.00 |
| Xmit Power Splitter Loss | dB: | 0.00 | 0.00 |
| RF Branching Loss | dB: | 0.00 | 0.00 |
| Connector & Safety Loss | dB: | 0.83 | 0.83 |
| Xmit Attenuator Pad Loss | dB: | 30.00 | 30.00 |
| Rcvr Attenuator Pad Loss | dB: | 0.00 | 0.00 |
| Total System Loss | dB: | 165.14 ---> | <--- 165.14 |
| RF Manufacturer & Model No. | : | LYNX CP6 | LYNX CP6 |
| Transmitter Stability (+/-) | %: | | |
| Antenna Polarization | : | | |
| Antenna Mfr., Size & Type | : | 8' | 8' |
| Antenna Height - Pri/Div - AGL | Ft: | 57.0 / 0.0 | 57.0 / 0.0 |
| Antenna Gain - Pri/Div | dBi: | 41.50 / 0.00 | 41.50 / 0.00 |
| Total Primary Antenna Gain | dBi: | 83.00 | |
| Transmitter Power | dBm: | 28.00 | 28.00 |
| Total System Gain | dB: | 111.00 | 111.00 |
| Effective Radiated Power | dBm: | 36.00 | 36.00 |
| Unfaded Receive Signal Level | dBm: | -54.14 ---> | <--- -54.14 |
| Rx Threshold | dBm: | -86.00 | -86.00 |
| Composite Fade Margin | dB: | +31.90 | +31.90 |
| Propagation Reliability | %: | 99.99968180 | 99.99968180 |
| Outage | Sec/Year: | 100.34 | 100.34 |

* * Outages are one-way severe errored-seconds per year for 1x10E-6 BER * *

Climate & Terrain: 4.000 Terrain Rough.: 100.0 Avrg. Temp: 68

Fade Margins (dB): DFM: 81 AIFM: 0 Model: Digital

TFM: 31.9 EIFM: 0

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